highlights from the first 6 months of IGRINS operations and look at the future of IR spectroscopy both with IGRINS and with GMTNIRS, a UT/KASI/KHU instrument for the Giant Magellan Telescope.

외부은하 / 은하단

[구 GC-01] A comparison of single-epoch black hole masses at z>0.5

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Accurately estimating black hole (BH) masses at high redshifts is imperative in the current and future era of large-area extragalactic spectroscopic surveys. We present an extension of existing comparisons between rest-frame UV and optical virial BH mass estimators to intermediate redshifts, lower luminosities, and lower BH masses, comparable to the local Hβ reverberation-mapping sample. We use data from the AGES survey and also newly acquired near-infrared spectra from the FMOS instrument on Subaru telescope for 89 broad-lined active galaxies at redshifts between 0.5 and 1.6. We focus on the MgII, CIV, and CIII broad emission lines and compare them to both Hα and Hβ, using two different prescriptions to describe their emission profile width. We confirm that MgII shows a tight correlation with Hα, with a scatter of ~0.25 dex. The CIV and CIII estimators can be considered viable virial mass estimators, despite large scatter values. We combine our dataset with previous high redshift and high luminosity CIV and CIII measurements from the literature and we calculate a scatter of ~0.4 dex and an offset to the 1:1 relation consistent with 0 for the combined sample. This updated comparison spans a total of 4 decades in BH mass, a much wider range than any previous individual study.

[구 GC-02] Identifying Young AGNs using the Korean VLBI Network

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High frequency peakers (HFPs) are promising candidates for young active galactic nuclei (AGNs). Their small physical scale (< 1 kpc) and radio spectrum peaked at high frequency (> 5 GHz) are suggestive that it has been only about 10^2-10^3 years since a central massive black hole in their host galaxies was launched. Until recently however, long-term monitoring radio observations at frequencies which are high enough to cover the true peak of HFP candidates were rare. Therefore, previous HFP samples are often contaminated by blazars, which are highly variable, hence may show a similar radio spectrum as HFPs depending on the observational epoch. In this work, we challenge to identify genuine young AGNs by monitoring HFP candidates at high radio frequencies. We performed single-dish monitoring of 19 candidates in 18 epochs over 2.5 years at 22 and 43 GHz using the Korean VLBI Network (KVN). Also, using KaVA, a combined array of the KVN and the VERA in Japan, we carried out 22 GHz VLBI observations of two HFPs and one blazar selected from our sample in order to compare their parsec scale (milli-arcsecond scale) morphology. HFPs are expected to have double/triple features, so called compact symmetric objects, which are scaled-down versions of extended radio galaxies, while blazars typically show core-jet morphology. We discuss the properties of AGNs at their very early evolutionary stage based on the results of the KVN and KaVA observations.

[구 GC-03] AGN gas outflows out to z ~ 0.2

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Using a large sample of 32,000 type 2 AGNs out to z = 0.2, we present the statistical results on the ionized gas outflows, based on the analysis of the velocity shift of narrow emission lines with respect to the systemic velocity measured from the stellar absorption lines. Considering the projection effect, the fraction of type 2 AGNs with the [O III] velocity offset, which is ~50%, is comparable to that of type 1 AGNs. The velocity dispersion of [OIII] is typically larger than that of Ha, suggesting that outflow is prevalent in type 2 AGNs. A weak correlation of the OIII luminosity with velocity shift and velocity dispersion indicates that outflow velocity is stronger for higher luminosity AGNs. Based on our 3-D biconical outflow models with simple assumptions on the velocity structure, we simulate the projected 2-D velocity and velocity dispersion

maps, which are spatially integrated to reproduce the measurements of SDSS AGNs. By comparing the distribution of the measured velocity and velocity dispersion of OIII, with the model grids, we constrain the intrinsic outflow velocities. The outflow velocity ranges from a few hundreds to a thousand km/s, implying a strong feedback to ISM.

[구 GC-04] A NEW TYPE 1 AGN POPULATION AND ITS IMPLICATION ON THE AGN UNIFIED MODEL

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We have discovered an unexplored population of galaxies featuring weak broad-line regions (BLRs) at z < 0.2 from detailed analysis of galaxy spectra in the Sloan Digital Sky Survey Data Release 7. These objects predominantly show a stellar continuum but also a broad Hα emission line, indicating the presence of a low-luminosity active galactic nucleus (AGN) oriented so that we are viewing the central engine directly without significant obscuration. These accreting black holes have previously eluded detection due to their weak nature. The new BLR AGNs we found increased the number of known type 1 AGNs by 49%. Some of these new BLR AGNs were detected at the Chandra X-ray Observatory, and their X-ray properties confirm that they are indeed type 1 AGN. Based on our new and more complete catalogue of type 1 AGNs, we derived the type 1 fraction of AGNs as a function of [OIII] λ5007 emission luminosity and explored the possible dilution effect on the obscured AGN due to star-formation. The new type 1 AGN fraction shows much more complex behavior with respect to black hole mass and bolometric luminosity than suggested by the existing receding torus model. The type 1 AGN fraction is sensitive to both of these factors, and there seems to be a sweet spot (ridge) in the diagram of black hole mass and bolometric luminosity. Furthermore, we present a hint that the Eddington ratio plays a role in determining the opening angles.

This work is submitted to ApJS.

[박 GC-05] Distant Quasars: Black hole mass growth and dust emission

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The massive limit of black holes (BHs) is observed as present day ten billion solar masses. We search for observational signatures of BHs that become extremely massive (EMBHs, 1-10 billion solar masses). I will report on the evolution of active galactic nuclei (AGNs) through the growth of BH mass and their dust emission strength. First, we measured 26 EMBH masses of quasars at $1<z<2$ from rest-frame optical spectroscopy, to better define the massive limit of BH masses of AGNs from rest-UV spectroscopy, and to test for additional uncertainties in the measurements. Next, using a sample of 155 luminous quasars at $3<z<6$ observed with the AKARI, we measured the BH masses from rest-frame optical spectra, extending the scaling relations between AGN continuum and line luminosities to luminous, high redshift quasars. We also investigated the BH mass estimator scaling relations of H-alpha, MgII, and CIV compared to the H-beta BH mass estimator, providing constraints on the massive end of BH mass growth at high redshift. Lastly, we identified and characterized a population of luminous dust-poor quasars at $z<5$ - quasars showing little IR emission from the AGN dusty structure. Compiling a rest-frame UV to IR library of 41,000 optically selected type-1 quasars, we fitted the broad-band spectral energy distributions (SEDs) with accretion disk and dust model components. We find that 0.6% of the sample is hot-dust-poor, and present their observed properties.

[구 GC-06] Cosmological Tests using Redshift Space Clustering in BOSS DR11

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We analyze the clustering of large scale structure in the Universe in a model independent method, accounting for anisotropic effects along